Draft
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ENERGY STAR® Program Requirements for Residential Light Fixtures

Partner Commitments

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified residential light fixtures. The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on residential light fixtures and specifying the testing criteria for residential light fixtures. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;

- comply with current ENERGY STAR Logo Use Guidelines, describing how the ENERGY STAR labels and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;

- qualify at least one ENERGY STAR labeled residential light fixture model within one year of activating the residential light fixtures portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;

- provide clear and consistent labeling of ENERGY STAR qualified residential light fixtures. The ENERGY STAR label must be clearly displayed on the product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed;

- train sales staff on the ENERGY STAR program. This training shall include: a) identification of ENERGY STAR labeled products within the store, b) tips for selling ENERGY STAR labeled products, and c) tips for answering questions about the ENERGY STAR program;

- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying residential light fixture models. Once the Partner submits its first list of ENERGY STAR labeled residential light fixture models, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;

- for each qualifying residential light fixture model, provide to EPA test data to certify that the fixture has met the required safety acceptance and performance tests. EPA will only add models to its Product List after reviewing and approving the product test results;

- provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified residential light fixtures shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no

later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;

- notify EPA of a change in the designated responsible party or contacts for residential light fixtures within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;

- purchase ENERGY STAR labeled products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR labeled product information to employees for use when purchasing products for their homes;

- ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;

- provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR labeled product models;

- feature the ENERGY STAR label(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;

- provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, communicate, and/or promote Partner's activities, provide a EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR labeled products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;

- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.

ENERGY STAR® Program Requirements for Residential Light Fixtures

Eligibility Criteria

Below is the product specification for ENERGY STAR qualified residential light fixtures. A product must meet all of the identified criteria if it is to be qualified as ENERGY STAR by its manufacturer.

Scope:

The ENERGY STAR residential light fixture specification covers the requirements for indoor and outdoor light fixtures intended primarily for residential type applications. Residential applications include single-family and multi-family dwellings (such as houses and apartments), dormitories, assisted-living facilities and hotels.

The intent of ENERGY STAR for Residential Light Fixtures is to move consumers from traditional incandescent fixtures to fixtures that use high-quality fluorescent or other energy-efficient technologies, including outdoor motion-sensors and daylight-sensors.

1) Definitions: Below is a brief description of related terms as relevant to ENERGY STAR.

   A. Light Fixture (Luminaire): A complete lighting unit consisting of a lamp or lamps, and ballasting (when applicable) together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power supply.

   B. Lamp: A generic term for a manufactured source of light. By extension, the term is also used to denote sources that radiate in regions of the spectrum adjacent to the visible.

   C. Ballast: A device used with an electric-discharge lamp to obtain the necessary circuit conditions (voltage, current and waveform) for starting and operating.

   D. Measured Input Power: The actual total power used by all the lamps and ballast(s) of the light fixture when operating, measured in watts (W).

   E. Rated Voltage: The supply voltage (V) as marked on the ballast.

   F. Rated Lumen Output: The initial luminous flux of the lamp as rated by the lamp manufacturer.

   G. Ballast Factor (BF): The fractional lumen output of a lamp operated on a ballast as compared to the lumen output when operating on a reference ballast used by manufacturers for determining the rated lamp lumen output.

   H. System Efficacy: The total initial lumens of the lamp, as published by the lamp manufacturer, multiplied by the ballast factor, as published by the ballast manufacturer, divided by the measured input power of the light fixture, which includes ballast losses. System efficacy is calculated in lumens per watt (lpw). For light fixtures using multiple lamps and ballasts, efficacy is determined for each lamp/ballast combination and then compared to the ENERGY STAR efficacy requirements.

   I. Lamp Current Crest Factor: Ratio of peak current to the root mean square (RMS) lamp current.

   J. Ballast Frequency: The frequency at which the ballast operates the lamp, measured in Hertz (Hz) or kilohertz (kHz).

   K. Color Rendering: The effect that the spectral characteristics of the light emitted by the lamp has on the color appearance of the objects illuminated by the lamp. Color Rendering Index is

measured on a scale of zero to 100, and is defined in terms of a comparison of the spectral tri-stimulus values of the objects under test illumination and a reference or standard illumination according to the recommendations of CIE Publication No. 13.2.

L. Correlated Color Temperature (CCT): The actual color of the lamp is called the color temperature and is defined in terms of the spectral tri-stimulus values (color coordinates) according to the recommendations of CIE Publication No. 13.3. For color coordinates near the Black Body loci, the correlated color temperature, measured in Kelvin (K), is used.

M. NFPA: The National Fire Protection Association (United States) develops the National Electric Code (NEC).

N. ANSI: American National Standards Institute.

O. IESNA: Illuminating Engineering Society of North America.

P. CIE: Commission Internationale de l'Eclairage.

2) Qualifying Products: For the purposes of ENERGY STAR, a Residential Light Fixture is a light fixture used primarily, although not exclusively, in the home. These fixtures can also be found in hotels, public or military housing, university dormitories and some light-commercial applications.

3) Energy-Efficiency Specifications for Qualifying Products: Products listed in Section 2 that meet the specifications outlined below in Table 1 for indoor fixtures, or Tables 2A or 2B for outdoor fixtures, may qualify as ENERGY STAR. Fixtures intended for outdoor use may be qualified under either Table 2A: Light Source or Table 2B: Operating Time:

Table 1 - Indoor Fixtures (Version 3.1)

Performance Characteristic	**ENERGY STAR Specification**
System Efficacy, expressed in Lumens Per Watt (LPW) *(see reference formula, Section 4, below)* All Fixture Types: Below 30 watts measured input power All Fixture Types: ≥ 30 watts measured input power Linear Lamp Fixtures (electronic ballasts required), ≥ 24 inches and ≥ 30 watts input power	 ≥ 50 LPW ≥ 60 LPW ≥ 70 LPW
Power Factor	≥ 0.5
Lamp Life	For lamps shipped with fixtures, lamps must have a rated life of at least 6,000 hours.
Lamp Current Crest Factor	≤ 1.7 Per ANSI C82.11-5.6.1

Lamp Start	The time needed after switching on the lamp to start continuously and remain lighted, must be an average of one second or less. For manufacturers using magnetic ballasts and rapid start lamps with integrated electronic starting chips, lamps must be included with fixtures when shipped from the factory.
Color Quality	
Lamp Color Rendering	Color Rendering Index ≥ 80
Correlated Color Temperature	For fixtures that include lamps, if the product has a *rated* color temperature of 2700K or 3000K (*actual measured* CCT of 2700 to 3000K ± 200K), the packaging should clearly describe the color of the product (cool or warm) and state the intended use for the product.
Dimming	Torchiere style portable fixtures shall be dimmable from 100% to 30% or less of maximum light output, or be switchable to three levels of brightness, not including off position.
Noise	Class A sound rating.
Warranty for defects in material and manufacturing	"Repair or replacement of all electrical parts of the lighting fixture including ballasts, switches, sockets and wiring (except lamp) that become defective under normal usage for three (3) years from the date of purchase. Repair or replacement of all non-electrical parts of the lighting fixture including housing, reflectors, diffusers and fasteners that become defective under normal usage for two (2) years from the date of purchase. Written fixture warranty must be included with fixture when purchased."
Safety	Fixtures must be tested and listed by UL, ETL, CSA, or other independent laboratory accredited by OSHA as a Nationally Recognized Testing Laboratory, acceptable for compliance with NFPA 70, National Electric Code. Must be tested and listed in accordance with UL 935.
Portable Fixtures	Portable fixtures must be tested and listed in accordance with UL 153.
Hardwired Fixtures	Hardwired fixtures must be tested and listed in accordance with UL 1598.

Ballasts and “fluorescent adapters” (as defined by UL)	All ballasts and “fluorescent adapters” must be recognized or listed with UL 935 and 1993 respectively.
Performance Characteristics for Fluorescent Ballasts	
General	Per ANSI C82.11-5 (all parts) Per UL 935
Operating Temperature	Per ANSI C82.11-7.2
Electromagnetic and Radio Frequency Interference	Per FCC 47 CFR Part 18.305 and 18.307.
Ballast Frequency	60Hz to 33 kHz or ≥ 40 kHz
Transient Protection	Per ANSI/IEEE C 62.41, Category A, 7 strikes
End of Life Protection	Required for all T5 and smaller lamps, all ballasts must shut off current to lamps upon lamp failure.
Ballast Warranty	Ballast Manufacturers warranty, 3 years

Table 2A - Outdoor Fixtures: Light Source (Version 3.1)

Performance Characteristics	ENERGY STAR Specification
Maximum input power	150 watts
System Efficacy (Lumens per watt) up to 70 watts 70 to 150 watts	 ≥ 40 Lumens per watt ≥ 50 Lumens per watt
Mechanical	Lamp holder will operate only lamps that perform to the input power range of the fixture.
Operating Characteristics:	
Re-set	Resets automatically to automatic mode within 24 hours of a manual override or testing operation.
Shut-off	Automatic shut-off during daylight hours
Warranty for defects in materials and manufacturing	Repair or replacement of defective parts of the fixture housing or electronics (except lamp) for 2 years from the date of purchase. Written warranty must be included with fixture when purchased.

Safety	Fixtures must be tested and listed by UL, ETL, CSA, or other independent laboratory accredited by OSHA as a Nationally Recognized Testing Laboratory, acceptable for compliance with NFPA 70, National Electric Code, including listing for damp or wet locations (Articles 410-4a and Article 100).

Table 2B - Outdoor Fixtures: Operating Time (Version 3.1)

Performance Characteristics	**ENERGY STAR Specification**
Maximum Lamp Input Power	250 watts
Shut-off	Automatic shut-off during daylight hours; and automatic shut-off within a maximum of 15 minutes of either a manual on signal, or no motion in the fixture's field of view.
Operating Characteristics:	
Re-set	Resets automatically to automatic mode within 24 hours of a manual override or testing operation.
Warranty for defects in materials and manufacturing	Repair or replacement of defective parts of the fixture housing or electronics (except lamp) for 2 years from the date of purchase. Written warranty must be included with fixture when purchased.
Safety	Fixtures must be tested and listed by UL, ETL, CSA, or other independent laboratory accredited by OSHA as a Nationally Recognized Testing Laboratory, acceptable for compliance with NFPA 70, National Electric Code, including listing for damp or wet locations (Articles 410-4a and Article 100).

4) Test Procedures and Reference Standards:

Efficacy:
Efficacy shall be determined by the following equation.

$$\text{Efficacy [Lumens per Watt]} = \frac{\text{Initial Rated Lamp Lumens [Lumens]} \times \text{Ballast Factor}}{\text{Rated Input Power [Watts]}}$$

Ballast Factor:
Refer to ANSI C82.1 and ANSI C82.3 for information on regular ballasts and reference ballasts when determining ballast factor. Refer to IESNA LM 9 and IESNA LM 66 for photometric testing procedures of full-size and compact fluorescent lamps. For magnetic ballasts, unless otherwise

documented, a default factor of .84 shall be used. For electronic ballasts, unless otherwise documented, a ballast factor of .94 shall be used.

End of Life Protection:
For fixtures using lamps of T-5 or smaller, manufacturer must submit an engineering description outlining the scheme that is used to achieve the end of life function within the ballast. For more information contact NEMA at (address) or see: http://www.nema.org/products/div2/white_papers.html

Noise:
Magnetically and electronically-ballasted fixtures must not exceed a measured level of 24dBA (audible) when measured with a sound meter (similar in performance to B&K type 2209) where the microphone is located 12 inches from the fixture in any direction.

Ballast Operating Temperature:
Per ANSI C82.11-7.2, the hottest spot on the ballast case must not exceed 90°C; high frequency ballasts must not exceed ballast manufacturers' recommendations if less than 90°C is specified.

Reference Standards:

Performance Characteristic	**Reference Standard**
Efficacy	IESNA LM-9; IESNA LM-66
Current Crest Factor	ANSI C82.11-5.6.1
Electromagnetic and Radio Frequency Interference	FCC 47 CFR Part 18.305 and 18.307
Color Quality	CIE Pub. 13.2; CIE Pub. 13.3
Transient Protection	ANSI/IEEE C62.41
Safety	UL 153; UL 1598
Ballast Performance	ANSI C82.11; UL 935
Ballast Factor	ANSI C82.1 and ANSI C82.3 IESNA LM 9 and IESNA LM 66

Testing Documentation:

ENERGY STAR qualified luminaires must be tested, listed, and labeled by an organization accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) or the American Association for Laboratory Accreditation (A2LA) as having the capability for safety testing, listing, and labeling of those products. These organizations include Canadian Standards Association (CSA), Underwriters Laboratories (UL), Intertek Testing Services Performance Division (formerly ETL Testing Laboratories), Factory Mutual (FM), and others. Manufacturers shall certify that the luminaires meet the manufacturers' declared performance criteria, and the minimum performance criteria contained in this ENERGY STAR specification for the characteristics shown above (and within three percent of the minimum performance criteria contained in the specification for efficacy). The sample size required for compliance with the ENERGY STAR performance criteria is 3 units per individual model. When luminaires use common lamp-ballast components in several fixtures, only one set of tests is required. OEM lamp-ballast manufacturers may supply a single set of tests to manufacturers for submission to EPA.

5) Effective Date: Manufacturers may sign this agreement on or before February 16, 2001. All products submitted by company as qualified under ENERGY STAR specifications must comply with the technical

requirements contained in this document by May 16, 2001. Products meeting the former ENERGY STAR specification must be re-submitted by that date in order to remain qualified.

6) Future Specification Revisions: ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification will be arrived at through industry discussions.